DATA EVALUATION RECORD
SEEDLING EMERGENCE EC_{25} TEST
§122-1(a) (TIER I)

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1. **CHEMICAL:** Pyraclostrobin — PC Code No.: 099100

2. **TEST MATERIAL:** BAS 500 00 F — Purity: 24.3%

3. **CITATION:**

Author: J. Aufderheide

Title: Effect of BAS 500 00 F on Seedling Emergence and Growth of Selected Non-Target Terrestrial Plants (Tier I)

Study Completion Date: October 18, 2001

Laboratory: ABC Laboratories, Inc.
7200 E. ABC Lane
Columbia, Missouri 65202

Sponsor: BASF Corporation
26 Davis Drive
Research Triangle Park, NC 27709

Laboratory Report ID: 46887; 66870 (BASF Study Number)

MRID No.: 45531101

DP Barcode: D290364

4. **REVIEWED BY:** Rebecca Bryan, Staff Scientist, Dynamac Corporation

Signature: **Date:** 2/15/04

APPROVED BY: Teri Myers, Ph.D., Staff Scientist, Dynamac Corporation

Signature: **Date:** 2/15/04

5. **APPROVED BY:** Lewis Brown, OPP/EFED/ERB

Signature: **Date:**

6. STUDY PARAMETERS:

Scientific Name of Test Organism: Dicots: *Brassica oleracea, Daucus carota, Cucumis sativus, Latuca sativa, Glycine max, Lycopersicon esculentum*
Monocots: *Zea mays, Avena sativa, Allium cepa, Lolium perenne*

Definitive Study Duration: 22 days

Type of Concentrations: Nominal

7. CONCLUSIONS:

Seedling emergence, shoot height, and dry weight were studied on 10 plant species after pre-emergent application of Pyraclostrobin, as BAS 500 00 F in a Tier I study. Test species included carrot, cabbage, cucumber, lettuce, soybean, tomato, corn, oat, onion, and ryegrass.

The test was performed at a rate of 0.50 lbs a.i./A (calculated 0.48 lbs a.i./A). Tomato was also tested at 0.25 lbs a.i./A. No species or endpoint exhibited sensitivity to treatment (i.e., exhibited a reduction which exceeded 25%); however, a NOEC could not be determined for oat (based on dry weight) and, because this was a Tier I study, an EC_{05} could not be determined for this species and endpoint.

This study is classified as Core.. This study is scientifically sound fulfills the guideline requirements (Subdivision J, §122-1 (a; TIER I)) for a seedling emergence study

Most sensitive monocot: N/A
Most sensitive endpoint: N/A
EC_{05}: <0.48 (corn and oat)
EC_{25}: >0.48 lbs a.i./A
NOAEC: <0.48 lbs a.i./A (oat)

Most sensitive dicot: N/A
Most sensitive endpoint: N/A
EC_{05}: <0.48 (carrot and lettuce)
EC_{25}: >0.48 lbs a.i./A
NOAEC: 0.48 lbs a.i./A (all species)

8. ADEQUACY OF THE STUDY:

A. Classification: Core

B. Rationale: This study fulfills the US EPA guideline requirements for seedling emergence studies (Subdivision J, §122-1 (a; TIER I)).

C. Repairability: None

9. GUIDELINE DEVIATIONS:

None.

10. SUBMISSION PURPOSE: This study was submitted to provide data on the phytotoxicity of pre-emergent application of BAS 500 00 F to non-target terrestrial plants for the purpose of chemical registration.

11. MATERIALS AND METHODS:

A. Test Organisms

Guideline Criteria	Reported Information
Species: 6 dicots in 4 families, including soybean and a rootcrop; 4 monocots in 2 families, including corn.	Dicots: carrot, cabbage, cucumber, lettuce, soybean, tomato Monocots: corn, oat, onion, and ryegrass
Number of plants per repetition:	Lettuce, carrot, oat, onion, and ryegrass: 10 plants per replicate, one replicate per treatment Cabbage, corn, cucumber, soybean, and tomato: 5 plants per replicate, two replicates per treatment.
Source of seed and historical % germination of seed:	See Appendix B, p. 39 for seed source information; the germination rates were 82-98%.

B. Test System

Guideline Criteria	Reported Information
Solvent:	None
Site of test:	Performed in environmentally regulated greenhouses at ABC Laboratories.
Planting method/type of pot:	Square plastic pots measuring 10-cm x 10-cm x 12-cm.
Method of application:	Spray booth with moving spray head.
Method of watering:	Bottom-watered with well water initially and at least once daily during testing (p. 22).
Growth stage at application:	seed (soil surface)

C. Test Design

Guideline Criteria	Reported Information
Dose range: 2x or 3x	N/A
Doses: At least 5	0.50 g a.i/ha (calculated 0.48 lbs a.i./A); Tomato also tested at 0.25 lbs a.i./A.
Controls: Negative and solvent	Negative control
Replicates per dose: At least 3	1-2 replicates
Test duration: 14 days	22 days
Were observations made at least weekly?	Weekly observations
Maximum dosage rate:	2,920 mg a.i./L (p. 18).

12. REPORTED RESULTS:

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes
Was a NOEC observed for each species?[1]	No; a NOEC was not determined for oat.
Phytotoxic observations:	Scale of 0-100 with 100 indicating maximum effect (100% mortality).
Were initial chemical concentrations measured? (Optional)	Yes, the Tier I test concentration was measured.
Were adequate raw data included?	Individual plant data were provided.

1. Tier I terrestrial plant tests do not require the establishment of a NOAEC or LOAEC

Results for the most sensitive parameter of each species

Results Synopsis

Tier I

Crop	Emergence		Shoot length		Dry weight		Most sensitive parameter
	NOAEC [1]	EC_{25} [1]	NOAEC [1]	EC_{25} [1]	NOAEC [1]	EC_{25} [1]	
Cabbage	0.48	>0.48	0.48	>0.48	0.48	>0.48	None
Carrot	0.48	>0.48	0.48	>0.48	0.48	>0.48	None
Corn	0.48	>0.48	0.48	>0.48	0.48	>0.48	None
Cucumber	0.48	>0.48	0.48	>0.48	0.48	>0.48	None
Lettuce	0.48	>0.48	0.48	>0.48	0.48	>0.48	None
Oat	0.48	>0.48	0.48	>0.48	0.48	>0.48	None
Onion	0.48	>0.48	0.48	>0.48	0.48	>0.48	None
Ryegrass	0.48	>0.48	0.48	>0.48	0.48	>0.48	None

Soybean	0.48	>0.48	0.48	>0.48	0.48	>0.48	None
Tomato	0.48	>0.48	0.48	>0.48	0.48	>0.48	None

[1] Units are lbs a.i./A.

Morphological Observations

Tier I

Cabbage: Emergence rates were 85 and 93% for the control and 0.48 lbs a.i./A treatment group, respectively, by 22 days.

The mean shoot lengths for the 0.48 lbs a.i./A treatment group 11% greater than the control. The mean shoot dry weights for the 0.48 lbs a.i./A treatment group were 7% greater than the control.

By 22 days, there was no effect on the phytotoxicity ratings in the 0.48 lbs a.i./A treatment group compared to the control.

Carrot: Emergence rates were 80 and 75% for the control and 0.48 lbs a.i./A treatment group, respectively, by 22 days.

The mean shoot lengths for the 0.48 lbs a.i./A treatment group were 2% greater than the control. The mean shoot dry weights for the 0.48 lbs a.i./A treatment group were -11% different from the control.

By 22 days, there was no significant effect on the phytotoxicity ratings in the 0.48 lbs a.i./A treatment group compared to the control.

Corn: Emergence rates were 100% for the control and 0.48 lbs a.i./A treatment group by 22 days.

The mean shoot lengths for the 0.48 lbs a.i./A treatment group were -1% different from the control. The mean shoot dry weights for the 0.48 lbs a.i./A treatment group were -9% different from the control.

By 22 days, there was no significant effect on the phytotoxicity ratings in the 0.48 lbs a.i./A treatment group compared to the control.

Cucumber: Emergence rates were 98 and 100% for the control and 0.48 lbs a.i./A treatment group, respectively, by 22 days.

The mean shoot lengths and dry weights for the 0.48 lbs a.i./A treatment group were -2% different from the control.

By 22 days, there was no significant effect on the phytotoxicity ratings in the 0.48 lbs a.i./A treatment group compared to the control.

Lettuce: Emergence rates were 88 and 85% for the control and 0.48 lbs a.i./A treatment group, respectively, by 22 days.

The mean shoot lengths for the 0.48 lbs a.i./A treatment group were -6% different from the control. The mean shoot dry weights for the 0.48 lbs a.i./A treatment group were -24% different from the control.

By 22 days, there was no effect on the phytotoxicity ratings in the 0.48 lbs a.i./A treatment group compared to the control.

Oat: Emergence rates were 100% for the control and 0.48 lbs a.i./A treatment group by 22 days.

The mean shoot lengths for the 0.48 lbs a.i./A treatment group were -9% different from the control. The mean shoot dry weights for the 0.48 lbs a.i./A treatment group were -20% different from the control.

By 22 days, there was no effect on the phytotoxicity ratings in the 0.48 lbs a.i./A treatment group compared to the control.

Onion: Emergence rates were 85 and 88% for the control and 0.48 lbs a.i./A treatment group, respectively, by 22 days.

The mean shoot lengths and dry weights for the 0.48 lbs a.i./A treatment group were 4% greater than the control.

By 22 days, there was no effect on the phytotoxicity ratings in the 0.48 lbs a.i./A treatment group compared to the control.

Ryegrass: Emergence rates were 90 and 98% for the control and 0.48 lbs a.i./A treatment group, respectively, by 22 days.

The mean shoot lengths for the 0.48 lbs a.i./A treatment group were 6% greater than the control. The mean shoot dry weights for the 0.48 lbs a.i./A treatment group were 24% greater than the control.

By 22 days, there was no effect on the phytotoxicity ratings in the 0.48 lbs a.i./A treatment group compared to the control.

Soybean: Emergence rates were 98% for the control and 0.48 lbs a.i./A treatment group, respectively, by 22 days.

The mean shoot lengths for the 0.48 lbs a.i./A treatment group were 4% greater than the control. The mean shoot dry weights for the 0.48 lbs a.i./A treatment group were 7% greater than the control.

By 22 days, there was no significant effect on the phytotoxicity ratings in the 0.48 lbs a.i./A treatment group compared to the control.

Tomato: Emergence rates were 90% for the control and 95% for the 0.25 and 0.48 lbs a.i./A treatment groups by 22 days.

The mean shoot lengths for the 0.25 lbs a.i./A treatment group were -9% different from the control. The mean shoot dry weights for the 0.25 lbs a.i./A treatment group were -5% different from the control. The mean shoot lengths for the 0.48 lbs a.i./A treatment group were the same as the control. The mean shoot dry weights for the 0.48 lbs a.i./A treatment group were 21% greater than the control.

By 22 days, there was no effect on the phytotoxicity ratings in the 0.25 and 0.48 lbs a.i./A treatment groups compared to the control.

Statistical Results

Statistical Method: The equation used for calculating the emergence, survival, and growth percent differences is found on page 17. The NOAEC and EC_{25} were estimated using the percent difference data.

Tier I
EC_{05}: Not reported
EC_{25}: >0.48 lbs a.i./A
NOAEC: 0.48 lbs a.i./A

13. REVIEWER'S VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: When inhibition exceeded 5%, data for plant height

and dry weight were analyzed to determine the NOAEC values using a Student's t-test to compare the treatment group to the control (treatment group means and p-values are provided in Excel spreadsheets in "raw data files"). Inhibition in this study did not exceed 25%, so the EC_{25} values could be determined visually. The NOAEC values for tomato endpoints were determined using ANOVA via TOXSTAT statistical software.

Results synopsis

Tier I

Species	Emergence			Shoot height			Dry weight			Most Sensitive Parameter
	NOAEC[1]	EC_{05}[1]	EC_{25}[1]	NOAEC[1]	EC_{05}[1]	EC_{25}[1]	NOAEC[1]	EC_{05}[1]	EC_{25}[1]	
Cabbage	0.48	>0.48	>0.48	0.48	>0.48	>0.48	0.48	>0.48	>0.48	None
Carrot	0.48	>0.48	>0.48	0.48	>0.48	>0.48	0.48	<0.48	>0.48	None
Corn	0.48	>0.48	>0.48	0.48	>0.48	>0.48	0.48	<0.48	>0.48	None
Cucumber	0.48	>0.48	>0.48	0.48	>0.48	>0.48	0.48	>0.48	>0.48	None
Lettuce	0.48	>0.48	>0.48	0.48	<0.48	>0.48	0.48	<0.48	>0.48	None
Oat	0.48	>0.48	>0.48	0.48	<0.48	>0.48	<0.48[a]	<0.48	>0.48	None
Onion	0.48	>0.48	>0.48	0.48	>0.48	>0.48	0.48	>0.48	>0.48	None
Ryegrass	0.48	>0.48	>0.48	0.48	>0.48	>0.48	0.48	>0.48	>0.48	None
Soybean	0.48	>0.48	>0.48	0.48	>0.48	>0.48	0.48	>0.48	>0.48	None

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Species	Emergence			Shoot height			Dry weight			Most Sensitive Parameter
	NOAEC[1]	EC_{05}[1]	EC_{25}[1]	NOAEC[1]	EC_{05}[1]	EC_{25}[1]	NOAEC[1]	EC_{05}[1]	EC_{25}[1]	
Tomato	0.48	>0.48	>0.48	0.48	ND	>0.48	0.48	ND	>0.48	None

[1] All NOAEC and EC_{25} values are reported in lbs a.i./A.
[a] The value determined by the reviewer was lower than the value reported by the study authors.
ND=could not be determined using the probit method.

Most sensitive monocot: N/A
Most sensitive endpoint: N/A
EC_{05}: <0.48 (corn and oat)
EC_{25}: >0.48 lbs a.i./A
NOAEC: <0.48 lbs a.i./A (oat)

Most sensitive dicot: N/A
Most sensitive endpoint: N/A
EC_{05}: <0.48 (carrot and lettuce)
EC_{25}: >0.48 lbs a.i./A
NOAEC: 0.48 lbs a.i./A (all species)

14. REVIEWER'S COMMENTS:

With the exception of the NOAEC for oat (which could not be determined by the reviewer's analysis), the reviewer's conclusions were similar to those of the study authors; no species exhibited sensitivity to treatment with BAS 500 00 F (Pyraclostrobin), as defined by inhibition exceeding 25%. Oat should be re-tested at a range of levels lower than that tested in this study to determine both a NOAEC and an EC_{05} for this species.

This study was conducted in accordance with USEPA Good Laboratory Practice Standards; Pesticide Programs (40 CFR, Part 160). The study includes a Quality Assurance statement.

15. REFERENCES

U.S. Environmental Protection Agency. 1989. Pesticide Programs; Good Laboratory Practice Standards; Final Rule (40 CFR, Part 160). *Federal Register*, 54 (158): 34067-34074.

U.S. Environmental Protection Agency-1982. Pesticide Assessment Guidelines. Subdivision J, Hazard Evaluation: Non-Target Plants.-1996. OPPTS 850.4100.

U.S. Environmental Protection Agency. 1986. Hazard Evaluation Division. Standard Evaluation Procedure. Non-Target Plants: Seed Germination/Seedling Emergence and Vegetative Vigor-Tiers 1 and 2.

Draft Rejection Rate Analysis: Ecological Effects, Special Review and Registration Division and Environmental Fate and Effects Division, February, 1994.

16. OUTPUT FROM REVIEWER'S STATISTICAL VERIFICATION:

tomato height
File: 1101th Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	2	225.752	112.876	1.364
Within (Error)	9	744.577	82.731	
Total	11	970.329		

Critical F value = 4.26 (0.05,2,9)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

tomato height
File: 1101th Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	control	103.650	103.650		
2	0.25	94.375	94.375	1.442	
3	0.48	103.500	103.500	0.023	

Dunnett table value = 2.18 (1 Tailed Value, P=0.05, df=9,2)

tomato height
File: 1101th Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	control	4			
2	0.25	4	14.021	13.5	9.275
3	0.48	4	14.021	13.5	0.150

tomato height
File: 1101th Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	4	103.650	103.650	103.650
2	0.25	4	94.375	94.375	98.938
3	0.48	4	103.500	103.500	98.938

tomato height
File: 1101th Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG TABLE P=.05	DEGREES OF FREEDOM WILLIAMS
control	103.650			
0.25	98.938	0.733	1.83	k= 1, v= 9
0.48	98.938	0.733	1.93	k= 2, v= 9

s = 9.096
Note: df used for table values are approximate when v > 20.

tomato dry weight
File: 1101tw Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	2	0.448	0.224	1.778
Within (Error)	9	1.136	0.126	
Total	11	1.584		

Critical F value = 4.26 (0.05,2,9)
Since F < Critical F FAIL TO REJECT Ho:All groups equal

tomato dry weight
File: 1101tw Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

	TRANSFORMED MEAN	CALCULATED IN

GROUP	IDENTIFICATION	MEAN	ORIGINAL UNITS	T STAT	SIG
1	control	1.720	1.720		
2	0.25	1.626	1.626	0.375	
3	0.48	2.074	2.074	-1.413	

Dunnett table value = 2.18 (1 Tailed Value, P=0.05, df=9,2)

tomato dry weight
File: 1101tw Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	control	4			
2	0.25	4	0.547	31.8	0.094
3	0.48	4	0.547	31.8	-0.355

tomato dry weight
File: 1101tw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	control	4	1.720	1.720	1.673
2	0.25	4	1.626	1.626	1.673
3	0.48	4	2.074	2.074	2.074

tomato dry weight
File: 1101tw Transform: NO TRANSFORMATION

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
control	1.673				
0.25	1.673	0.187		1.83	k= 1, v= 9
0.48	2.074	1.412		1.93	k= 2, v= 9

s = 0.355
Note: df used for table values are approximate when v > 20.